Microwave Brazing of TSP Diamond Drill Bit Cutters

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We have brazed TSP Diamond (TSP) to Tungsten Carbide (WC) substrates to form drill bit cutters using a single mode microwave cavity. Brazing was performed by coupling to the electric and/or magnetic field. The brazing was performed by preferentially heating the TSP diamond or the braze foil. The microwave heating process was controlled using a prescribed temperature or power profile. None of the processed cutters experienced cracking during the brazing process. Ultrasound tests conducted on samples produced by this method showed uniform distribution of the melted braze foil. The time to produce these brazes varied between 3 seconds and 20 minutes. The bonding was performed using TiCuSil foils as well as other types of foils with similar active components. Initial shear test of the brazed TSP to (WC) cutters has demonstrated shear strengths comparable to conventionally brazed cutters. We will present ultrasound test results showing the quality of the fillet braze produced by this bonding method.

brazing drill bit cutters